EFFICIENT SHOW-WINDOW ILLUMINATION

(C. 1915)

TABLES and Engineering Information Compiled by the Engineering Department of the National X-Ray Reflector Co., Chicago, and by J. R. Cravath, Consulting Engineer. Tests by Electrical Testing Laboratories, New York.

Efficient Show-Window Illumination

THERE is more waste in the illumination of show windows than in any other department of a store. If the same loss occurred in the other departments, it would mean quick bankruptcy to thousands of merchants. It is the purpose of this booklet to show how and where this loss occurs and how it can be stopped. Cases where there is thirty to fifty per cent loss are very common, and in many instances there is more than this.

This loss is due to the inefficiency of the reflecting surfaces of the reflectors used, to poor design and improper shape of reflectors, and to the use of reflectors ill suited to the purpose, as will be fully explained.

As the item of show window lighting runs from a nominal sum up to $5,000.00 per year, in the case of some of the largest companies, it is easy to realize that the waste in show window lighting in the aggregate is enormous.

This condition of affairs is not entirely the merchant's fault. Until recently he has had no scientific engineering information by which to be guided. The usual plan has been the "hit or miss" one of installing any kind of a reflector the merchant or the electrician thought would do. Often the merchant has installed some particular reflector after having seen some other show windows, where radically different conditions prevailed, apparently well illuminated with the same reflector.

ILLUMINATING ENGINEERING of show windows has recently made great advances. Instead of wasting from thirty to fifty per cent of the light (a) on the ceiling, (b) on the ends of the window, (c) in the extreme top of the back of the window, and (d) on the sidewalk, the light can now be concentrated on the goods where needed, by using powerful opaque one-piece mirror reflectors of correct design, thereby not only eliminating loss, but greatly improving the effect on the goods displayed.

THE TUNGSTEN LAMP with a given current consumption produces about three times the light obtained from the carbon filament lamp. When used with the recently perfected reflectors of scientific design the show window is illuminated to the best advantage, from both the standpoint of lighting effect and economy.

In these days of constantly increasing operating expense in the conduct of a business, it will be interesting for the merchant to realize that, in this department at least, better results can be obtained, with a saving in operating cost.

Some Fundamental Principles of Window Lighting

In the show window, no light should be exposed so as to be in the ordinary range of vision. The show window being primarily to attract the purchasers' attention to the goods displayed rather than to the electric light, nothing should detract from this purpose. In this connection the merchant can well learn a lesson from the theatrical stage manager.

Brilliant exposed lamps are used in theatrical effects on or near the stage, only when it is desired to blind the audience temporarily so that changes of scene or tricks of magic on the stage

Thousands of Poke Bonnet installations similar to the above are to be seen throughout the United States and Canada.

The above window photographed by light from old style carbon filament lamps in Poke Bonnet Reflectors. Exposure 3 minutes.

cannot be seen. In the performance of some feats of magic, this temporary blinding of the audience by means of brilliant light is very cleverly effected by a row of powerful lamps with reflectors around the borders of the stage. In this way the audience is prevented from seeing certain changes which might otherwise be detected. But note that exposed lamps are NEVER used when it is desired that you should have the best view of the stage.

A good way to blind your prospective customer, so he cannot see the goods on display in your window, is to put exposed lamps around the window borders or suspend them from chandeliers or so install them in the top of the window that his eye cannot escape them.

The light must come from in front of the goods in order to avoid shadows. If the lamps are placed in the middle of the show window ceiling, the front of goods displayed in the front of the window will be in darkness, because of the shadows. Strange to say, many do not consider this. If the display is altogether on the bottom of the window, as in the case of a jewelry store, this shadow effect is unimportant. In the clothing or dry-goods store window, it is vital.

The Fair Show Windows, Chicago, with old style conical window reflectors

Carrying out this principle that light must be thrown on the goods from the front of the window in order that passers-by may see no shadows on the goods, practically means that the lamps must be placed high up in the window next to the window pane, because there is no other place where they can be put to throw the light in the proper direction and keep the lamps out of the ordinary range of vision.

Efficient Reflectors
A Prime Necessity

Common sense and the common practice of the largest and best managed concerns having established the proper place for show window lamps as the front and top of the window, what are the essential conditions for efficiency? Anyone can flood a show window with light by sticking enough lamps along the transom bar, but that does not mean that the lighting is done efficiently. Perhaps the same results (that is, the same illumination on the goods) could be accomplished with half the number of lamps or half the electricity.

To use the light generated by lamps efficiently so that the merchant gets his money's worth in illumination, is not a matter of hit or miss guess work, but requires good illuminating engineering. First of all, the lamps must be equipped with reflectors that will direct *all* the light into the windows instead of allowing it to escape into the street, and over the top and ends of the window.

The Fair Show Windows, Chicago, as they now appear with "Helmets"

Fig. 1, trough reflector with 100 watt Tungsten lamp.

FOR example, in Fig. 1 is shown a cross section of a window seven ft. deep, which is to be trimmed to a maximum height of 7 ft. at the back. The lamps are 13 ft. above the floor of the window, near the ceiling. The window in Fig. 1 is equipped with a cheap form of trough now frequently used with Tungsten lamps. This trough is effective in lighting windows only because of the large number of lamps which can be placed per front foot of window. In other words, the results are obtained at an extravagant cost for electricity. The reason for this is that a large per cent of the light is not directed into the show window at all, but is directed into the street, and over the top and ends of the window. Too much lighting of the side-walk detracts from the lighting effect. The darker the sidewalk the brighter the window will appear to be lighted. While it is not desirable to have the sidewalk in darkness, there need be no fear of this because the reflection from the goods and back of the window will light the sidewalk sufficiently for all practical purposes without allowing any light to escape there directly from the lamps and reflectors.

Fig. 2 shows a window of the same dimensions as Fig. 1 also equipped in an inefficient manner. In this case translucent prismatic or opal reflectors are used. These reflectors allow considerable light to pass through the reflector, which is an excellent characteristic for some kinds of lighting, but it is not at all adapted to a show window where it is desired to concentrate all of the light possible on the goods in the show window. With the focusing prismatic or opal reflector used with a 100 watt Tungsten lamp the maximum downward candle power obtainable is less than 300, as indicated in Fig. 2 (*The illumination in Fig. 2 was plotted from the published curve of the translucent reflector usually used for this purpose*). This low result as compared with the results that can be obtained, as shown later, is due to the fact that so much light is allowed to escape through the reflector and in other directions than on the goods displayed.

Fig. 3 shows a window of the same dimensions as Figs. 1 and 2, but equipped with a "Helmet" reflector, which was especially designed for lighting windows of this class.

The distribution of light from this "Helmet" as shown by tests is about as indicated, and it will be seen that nearly all of the light is delivered on the goods in the show window. Furthermore, because of the efficiency of the reflecting surface which is used, and because of the correct size and design of the "Helmet" for this particular work, over 800 maximum downward candle power is obtained, as against less than 300 with the translucent or prismatic reflector with the same size lamp in Fig. 2.

OF COURSE, if the window has different dimensions from those shown in Figs. 1, 2 and 3, and the lamps are placed lower, a different reflector from the "Helmet" would be required, and for this purpose we have the "Poke Bonnet" and the "Scoop." It is important to use the right reflector for the window. For example, if one were to attempt to light such windows as shown in Figs. 1, 2 and 3, with the "Poke Bonnet" reflector, (this reflector gives a very wide distribution, as will be noted from the information given later) the efficiency would be low because of the excessive amount of light delivered elsewhere than on the goods displayed. It will therefore be seen that it is not enough to simply prevent the light from falling outside of the window space. The reflector must have an efficient reflecting surface so as to efficiently direct into the window the light which would otherwise escape in other directions.

Fig. 3, the helmet with 100 watt Tungsten lamp, plotted from photometric curve. See page 8. Note that downward candle power is 800.

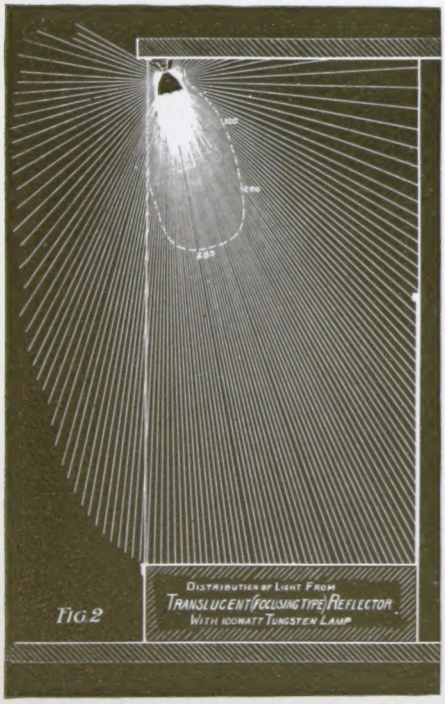


Fig. 2, translucent reflector with 100 watt Tungsten. Note that downward candle power is only 280.

It must also be accurately designed to so distribute the light within the window in such a manner as to illuminate all the goods displayed at about the same intensity.

These two points involve not only proper reflector design, but selection of the proper reflector for the particular window to be lighted. The tables and engineering information given in this booklet enables the proper selection to be made, but should there be any question in your mind about it, upon receipt of necessary information, viz.,—sketch of floor plan giving dimensions and height to transom bar as well as ceiling, we will gladly have our Engineering Department make recommendations and specifications.

The Reflector

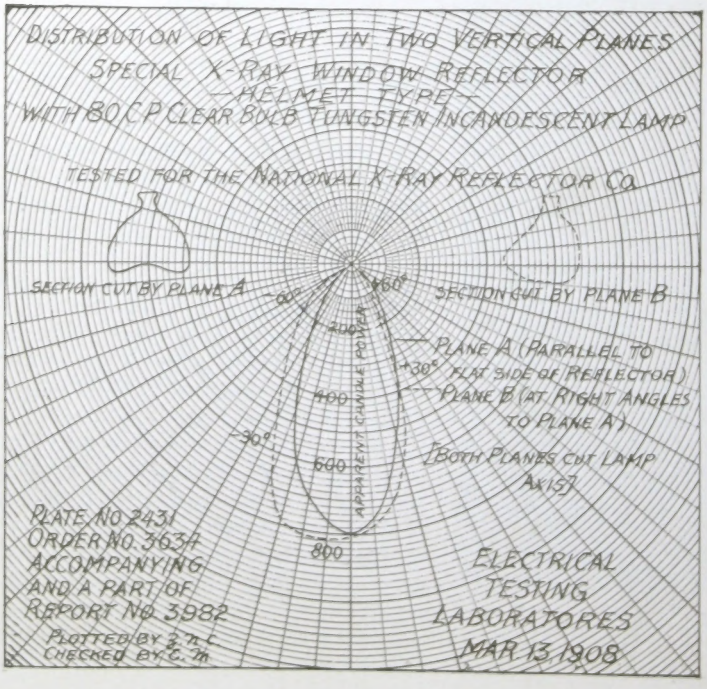
AS before stated, the reflector must have a reflecting surface that will be permanent and efficient. That is, it must remain bright and must not tarnish or blacken under the action of time and the heat of the lamps, as do ordinary mirror reflectors. It is evident that a dark blackened surface is not a good reflector and must absorb and waste the light which strikes upon it. Bright metal and white enamelled paint or opal surfaces have also been used for reflectors, but cannot compare in efficiency with pure silver plating, which maintains high efficiency for years. It is protected with an elastic enamel which keeps the silver plating in perfect condition. Reflectors being of one piece are not subject to falling apart as are sectional mirror reflectors with tin cases.

The particular object of this book is to tell you about the three different designs of reflectors developed after much engineering research. These reflectors are as follows:—

The "POKE BONNET," which is a shallow type of reflector taking two lamps in a horizontal position and giving a wide distribution of light; which suits it for use in low and deep windows.

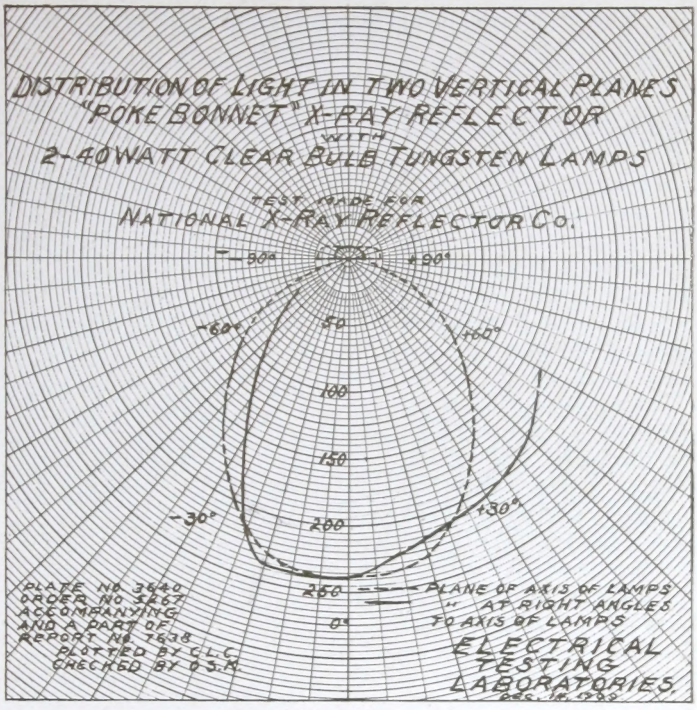
The "HELMET," which is very concentrating, and is designed for windows in which the lamps are used in a vertical pendant position at a considerable height above the window space.

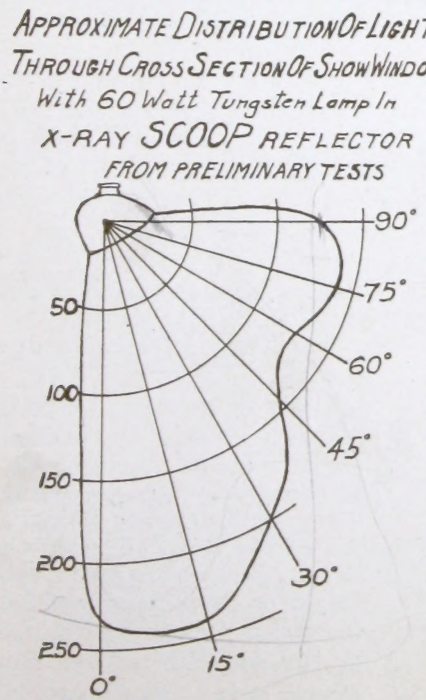
The "SCOOP" for windows intermediate between those adapted to the "Helmet" and the "Poke Bonnet," taking the lamp in a vertical pendent position.



These reflectors are easily installed and easy to keep clean, requiring only an occasional wiping out with a cloth. The silver plating is on the back of the glass, and hence is not affected by the cleaning. The glass is fire glazed which is easier to clean than polished plate or other glass.

Photometric curves made from tests by the Electrical Testing Laboratories of New York on these three different types of reflectors are reproduced here. A comparison with similar curves from other window reflectors will show anyone informed in such matters that no other reflector even approaches in efficiency these corrugated one-piece silver plated glass reflectors, or delivers anywhere near as much light within a window space with a given expenditure of electricity.





Photometric Curves

A word of explanation as to these curves will help the non-technical man to understand them. The lamp and reflector is supposed to be located at the center of the diagram where the radial lines come together. The rings or circles each represent a certain number of candle power as indicated by the figures on these circles. The distance of the curve from the center of the diagram indicates the candle power given by the lamp and reflector in that particular direction. For example, in the diagram giving the curve of the "Helmet" reflector, it is seen that the dotted curve crosses the 800 candle power line directly underneath the lamp. In other words, with the lamp and reflector as ordinarily used, 800 c. p. is given directly downward. Fifteen degrees away from this, in the direction of the back of the show window, the c. p. is 780, and twenty-five degrees from this vertical line the c. p. is 500.

NOTE.—The "Scoop" Reflector is also designed for use permanently suspended with lamp vertically pendant. The "Poke Bonnet" Reflector can be tipped to any angle desired to give the best results.

The Helmet

No. 755

THE "Helmet", designed for windows where the lamps are placed considerably above the space to be lighted uses the 100 watt Tungsten lamp in a vertical position. It is made large, first, because it is designed to take the large 100 watt Tungsten lamps so as to keep the cost of installation and lamp renewals as low as possible for the merchant, and second, because a large reflector is absolutely necessary for efficient utilization of the light in the class of windows for which this reflector is designed. A small reflector must necessarily allow to much light to escape in directions where it is not needed, viz.: over the top of the window space and out into the street. Although a large reflector, silver plated, is necessarily more expensive than small cheap reflectors, the cost is justified many times over by the results.

"Helmet" in Window (Pane at Right)
Diameter 12 inches. Height 11½ inches.
Price including Special Holder $5.00

The Helmet Shade Holder

3¼ Inches

ILLUMINATING engineers know that the majority of 3¼ inch shade holders are entirely inadequate to hold large reflectors and globes firmly. These become bent before being in service very long, or pull the shell of the socket loose, as they depend entirely upon the lower shell of the socket for support.

The Helmet 3¼ inch shade holder was designed for use on the Helmet reflector. It consists of stiff steel stampings finished in oxidized copper. The halves of the holder are clamped by means of screws over the neck or stem of the socket without removing or rewiring socket. Besides, this holder also clamps upon and helps to stiffen the shell of the socket so that the holder and socket reinforce each other to make a very stiff unit.

The "Helmet" shade holder

The Scoop

Reflector No. 777

Fig. 1, shown installed with window pane at left.

Size: Width 9-in., depth front to back 9-in
Height, including stem 7-in. Holder 2¼-in.
Price each $3 00

THE "Scoop" is suited to a large class of show windows, namely windows of average proportion—see table on page 15. As the advantages of such windows are now fully appreciated it is probable that a majority of new windows built will be of such size that they can be most satisfactorily lighted with the "Scoop".

The "Scoop" can very often be used to good advantage where a high and fairly deep show window has a transom bar placed at about two-thirds or three-quarters of its height with prism glass from there to the ceiling.

Fig. 2, front view.

In such instances the socket is supported by goose-necks from the transom bar or from conduit running the length of the window and suspended at correct height to give best results.

The "Scoop" is intended for use with a 60-watt Tungsten lamp placed in a vertical pendant position but can also be used with 40 or 100-watt Tungsten lamps. With 60-watt lamps best distribution is obtained. The sockets being placed in a vertical position no special skill is required for installation, as would be the case if the electrical contractor had to tip the sockets at exactly the right angle to get the best results. There is also less strain on the shade holder and socket with the socket vertical.

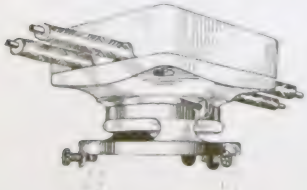


Fig. 3

Where reflectors are to placed at the ceiling conduit and condulet receptacles for shade holders are recommended.

Where moulding is used we advise moulding receptacles and shade holder as shown in Fig. 3 as space will be saved, adequate support provided and at lowest cost.

The Poke Bonnet

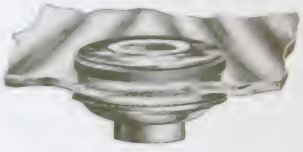
Reflector No. 750

Fig 1
Poke Bonnet
Supported from Ceiling

Length, 14 inches
Depth, 7 inches
When properly installed requires only 6 inches from bottom of reflector to ceiling.

THE "Poke Bonnet" reflector is very shallow and takes any kind of standard bulb incandenscent lamp in sizes up to the 40-watt short base Tungsten lamp, which latter is recommended for it. Each "Poke Bonnet" takes a pair of such lamps placed in a horizontal position. While there is a general impression that it is preferable to use Tungsten lamps with the filaments in a vertical position, it is not essential to their long life, if they are not disturbed too much and are not removed from their sockets after the first sagging of the filament takes place. If lamps and reflectors are cleaned with lamps burning, there is no abnormal breakages of lamps used in the horizontal position, as in the "Poke Bonnet." Besides this the 25 and 40-watt lamps used in this reflector have shorter and stronger filaments than the larger wattage lamps, therefor longer average life can be counted on than with any size or style of carbon filament lamp.

Detail of Adjustable and Stem



Detail of Bushing

The "Poke Bonnet" being shallow is adapted to low deep windows, and is sometimes of necessity used in shallow windows, where there is a limited space along the transom bar or next to the ceiling, for the reflector. As seen from the table, it is also suited to fairly high windows of unusual depth. As the photometric curve shows it gives a very wide distribution of light.

Fig 2. Showing interior of Trough with Twin Socket and Lamps.

The Poke Bonnet

Fig. 3

Style 750—Supported from Wall or Transom Bar.

Dotted Lines show method of adjusting to any angle desired.

ONE of the advantages of the "Poke Bonnet" over the common trough reflector to which we wish to call special attention, is the fact that the ends are so shaped as to reflect the light from the ends of the lamps down into the show window instead of allowing it to escape to the upper part of the sides of the window where it is of little use.

The "Poke Bonnet" being a complete unit in itself, can be kept in stock, and as many installed as are necessary for a given window. It is not necessary to have the reflectors made up especially of the right length for each window, as in the case of the ordinary troughs. It is easily cleaned and has no "slats" to drop out.

Price, each $6.50

Price includes reflector with twin sockets, latest type attachment plug and 18 inch armoured cord, complete ready to install.

Mr. Kesner of "The Fair" Chicago, writes:

Gentlemen

You will please deliver the balance of the Window Reflectors (190), the same as those installed in our State street windows.

We are now ready to install them on our Adams and Dearborn street front, and our electricians are all ready to receive them.

After trying different window reflectors, we find this reflector to be the best and most desirable for high show windows and certainly more economical,

Very truly yours,

THE FAIR

Gen'l. Mgr.

Use of Tables

IT IS vitally important that the proper reflector be selected for the height and depth of window to be lighted. For this purpose we have compiled the table on following page for the use of our customers. In this table it is assumed that the window is to be trimmed to a height of 7 ft. at the back. If it is a jewelry window, for example, in which the light is not wanted as high as 7 ft., subtract the height above the window floor at which light is wanted from 7 ft. and add this result to the height of the lamps.

Examples

A—Suppose we have a window 6 ft. deep from the window pane to the back and the lamps are to be placed 10 ft. above the floor of the window. The window has to be trimmed to the usual maximum height of 7 ft. at the back. On the right or left hand side of the table, find the height marked 10 ft. On the top or bottom of the table, find the depth marked 6 ft. At the point of crossing or the horizontal column corresponding to 10 ft. and the vertical column corresponding to 6 ft., find the answer "S" indicating "Scoop" reflector.

B—Suppose we have a jewelry store window in which no goods are placed more than 3 ft. above the floor of the window. The lamps are to be placed 9 ft. above the window floor, and the window is 4 ft. deep. Subtracting 3 ft., the maximum height at which light is wanted, from 7 ft., the usual height, gives 4 ft. Add this 4 ft. to 9 ft., the height of the lamps, giving 13 ft. as the theoretic height of the lamp in this case.

Find the horizontal column opposite 13 ft. height in the table, and the vertical column opposite 4 ft. depth. Where these columns cross, read the answer, "H" (Helmet Reflector.)

C—Suppose the same window were to be used for dry-goods and trimmed 7 ft. high. We would then take 9 ft. as the height of lamps and at the intersections of the 9 ft. height and 4 ft. depth columns read the answer, "S"; (Scoop Reflector).

THE HUB
Henry C. Lytton PRES
JACKSON BOUL. STATE AND QUINCY STS.

Mr. Lytton of "The Hub," Chicago, says:

CHICAGO, February 26, 1910.

We have installed the one hundred and forty-three (143) Helmets in a portion of our windows. We find them so satisfactory, and are so well pleased that we have decided to equip the balance of our windows.

Very truly yours,
The Hub,
By W. Lytton

TABLE—

PB=POKE BONNET
S=SCOOP
H=HELMET

TO determine correct reflector for show-window of any size. Use table as explained on page 14.

S† If the height of the "Scoop" is objectionable on account of limited room, the use of the Poke Bonnet is permissable.

Depth (in feet) from pane to back of window

Height of lamps (in feet) above floor of window.	3	4	5	6	7	8	9	10	11	12	13	14	Height of lamps (in feet) above floor of window.
20	H	H	H	H	H	H	H	H	H	H	H	S	20
19	H	H	H	H	H	H	H	H	H	H	S	S	19
18	H	H	H	H	H	H	H	H	H	S	S	S	18
17	H	H	H	H	H	H	H	H	S	S	S	S	17
16	H	H	H	H	H	H	H	S	S	S	S	S†	16
15	H	H	H	H	H	H	S	S	S	S	S†	S†	15
14	H	H	H	H	H	S	S	S	S	S†	S†	PB	14
13	H	H	H	H	S	S	S	S	S†	S†	PB	PB	13
12	H	H	H	S	S	S	S	S†	S†	PB	PB	PB	12
11	H	H	S	S	S	S	S†	S†	PB	PB	PB	PB	11
10	H	S	S	S	S	S†	S†	PB	PB	PB	PB	PB	10
9	S	S	S	S	S†	PB	PB	PB	PB	PB	PB	PB	9
8	S	S	S	S†	PB	PB	PB	PB	PB	PB	PB	PB	8
7	S	S	S†	PB	PB	PB	PB	PB	PB	PB	PB	PB	7
6	S	S†	PB	PB	PB	PB	PB	PB	PB	PB	PB	PB	6
	3	4	5	6	7	8	9	10	11	12	13	14	

Depth (in feet) from pane to back of window.

A Pointer on Window Trimming

As it is usually conceded that a show window has as great an advertising value by night as by day, and if well illuminated is much more prominent after night than by day, the trimming should be adapted to the artificial illumination. Nevertheless we frequently see windows so arranged that it is impossible to properly light the goods displayed. Always remember the direction from which the light is coming. Do not arrange the goods so that they cast shadows on themselves or on other goods. Do not put high objects near the front. Do not attempt to put too many high things close together in any part.

Lamps Per Front Foot

THE number of lamps per front foot of window or the watts per front foot required for good window illumination, depend very much on the location of the show window, whether it is on a brilliantly lighted street and in a city where a great deal of light is commonly used in show windows, or whether it is in a town where only a limited amount of show window lighting is common. For example, in a small country town a single reflector may give a better illumination of a window with an eight foot frontage, than is common among the other windows in the town. In large cities where dark dry-goods and men's clothing are displayed, some merchants consider that a window cannot be too brilliantly illuminated.

On account of the efficiency of our reflectors, and because of the fact that they confine and direct nearly all of the light where it is wanted, it is of course not necessary to employ such a frequent spacing of lamps as with other systems. Furthermore, our "Helmet" and "Scoop" reflectors are designed for large lamps of 80 and 48 horizontal candle power (100 and 60 watts) respectively so that the lamps can be spaced some distance apart and still give good results. Some splendidly lighted show windows in large cities have 100 watt lamps spaced 18 and 24 inches apart. In the small towns where lower standards of illumination prevail, this spacing can be safely increased to 36 inches or more.

Although our reflectors cost more than the cheap ones constructed on the "hit or miss" principle and having reflecting surfaces of no permanent value, this is compensated for by the fact that so few of them are necessary in the windows. When operating expenses are taken into account, ours are by far the cheapest reflectors that can be bought, as they will pay for themselves in a short time. It is an exceedingly "penny wise and pound foolish" policy to buy cheap and inefficient reflectors for this kind of work where monthly bills for window lighting involve so much money.

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